

WHAT IS CLAIMED IS:

1. A gas distribution system for distributing a gas to a substrate in an etch chamber, the system comprising:

5 a gas supply containing a gas;

a first flow channel coupled to the gas supply and oriented to distribute the gas to an inner portion of the substrate; and

a second flow channel coupled to the gas supply and oriented to distribute the gas to an outer portion of the substrate.

10 2. The gas distribution system of claim 1, wherein the first flow channel is coupled to the gas supply via a first flow path, and the second flow channel is coupled to the gas supply via a second flow path separate from the first flow path.

15 3. The gas distribution system of claim 1, further comprising a controller that controls the rate of flow of the gas through the first and second flow channels such that the rate of flow through the first flow channel is different than the rate of flow through the second flow channel.

20 4. The gas distribution system of claim 3, wherein the controller includes at least one programmable mass flow controller.

25 5. The gas distribution system of claim 4, wherein the controller includes a first programmable mass flow controller disposed to control the rate of flow of the gas through the first flow channel, and a second programmable mass flow controller disposed to control the rate of flow of the gas through the second flow channel.

6. The gas distribution system of claim 3, wherein the controller controls the rate of flow of the gas such that the rate of flow through the second flow channel is greater than the rate of flow through the first flow channel.

5 7. The gas distribution system of claim 1, further comprising a controller that controls a time of flow of the gas through the first and second flow channels such that the time of flow through the first flow channel is different than the time of flow through the second flow channel.

10 8. The gas distribution system of claim 7, wherein the controller includes at least one programmable mass flow controller.

15 9. The gas distribution system of claim 7, wherein the controller includes a first programmable mass flow controller disposed to control the time of flow of the gas through the first flow channel, and a second programmable mass flow controller disposed to control the time of flow of the gas through the second flow channel.

20 10. The gas distribution system of claim 7, wherein the controller controls the time of flow of gas such that the time of flow through the second flow channel is greater than the time of flow through the first flow channel.

25 11. The gas distribution system of claim 1, further comprising a valve for controlling a time of flow of the gas through one of the first and second flow channels such that the time of flow through the first flow channel is different than the time of flow through the second flow channel.

12. The gas distribution system of claim 1, further comprising a controller that controls a concentration of the gas that flows through the first and second flow channels such that the concentration of the gas that flows through the first flow channel is different than the concentration of the gas that flows through the second flow channel.

13. The gas distribution system of claim 12, wherein the controller controls the concentration of the gas such that the concentration of the gas that flows through the second flow channel is greater than the concentration of the gas that flows through the first flow channel.

14. The gas distribution system of claim 1, wherein each of the first and second flow channels includes a plurality of gas outlets for distribution of the gas to the substrate.

15. The gas distribution system of claim 1, wherein the first flow channel forms a cross-like pattern.

16. The gas distribution system of claim 1, wherein the second flow channel is oriented to distribute gas adjacent a peripheral portion of the substrate.

17. The gas distribution system of claim 1, further comprising a valve coupled between the inner and second flow channels, the valve being selectively operable to couple the first flow channel in fluid communication with the second flow channel.

18. A method for distributing a gas to a substrate in an etch chamber, the method comprising:
distributing a gas to an inner portion of the substrate via a first flow channel; and
distributing the gas to an outer portion of the substrate via a second flow channel.

19. The method of claim 18, further comprising delivering gas from a gas supply to the first flow channel via a first flow path, and delivering gas from the gas supply to the second flow channel via a second flow path separate from the first flow path.

20. The method of claim 18, further comprising controlling the rate of flow of the gas through the first and second flow channels such that the rate of flow through the first flow channel is different than the rate of flow through the second flow channel.

21. The method of claim 20, further comprising controlling the rate of flow of the gas such that the rate of flow through the second flow channel is greater than the rate of flow through the first flow channel.

22. The method of claim 18, further comprising controlling a time of flow of the gas through the first and second flow channels such that the time of flow through the first flow channel is different than the time of flow through the second flow channel.

23. The method of claim 22, further comprising controlling the time of flow of gas such that the rate of flow through the second flow channel is greater than the time of flow through the first flow channel.

24. The method of claim 18, further comprising controlling a concentration of the gas that flows through the first and second flow channels such that the concentration of the gas that flows through the first flow channel is different than the concentration of the gas that flows through the second flow channel.

25. The method of claim 24, further comprising controlling the concentration of the gas such that the concentration of the gas that flows through the second flow channel is greater than the concentration of the gas that flows through the first flow channel.

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26. The method of claim 18, wherein each of the first and second flow channels includes a plurality of gas outlets for distribution of gas to the substrate, and the method further comprises distributing the gas through the gas outlets.

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27. The method of claim 18, wherein the first flow channel forms a cross-like pattern.

28. The method of claim 18, wherein the second flow channel is oriented to distribute gas adjacent a peripheral portion of the substrate.

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29. The method of claim 18, further comprising selectively coupling the first flow channel in fluid communication with the second flow channel.

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30. A gas distribution system for distributing a gas to a substrate in an etch chamber, the system comprising:

a gas supply containing a gas;

a first flow channel coupled to the gas supply and oriented to distribute the gas to an inner portion of the substrate;

a second flow channel coupled to the gas supply and oriented to distribute the gas to an outer portion of the substrate; and

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a controller that controls the rate of flow of the gas through the first and second flow channels such that the rate of flow through the first flow channel is different than the rate of flow through the second flow channel.

31. A method for distributing gas to a substrate in an etch chamber, the method comprising:

distributing a gas to an inner portion of the substrate via a first flow channel;
distributing the gas to an outer portion of the substrate via a second flow channel;

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controlling the rate of flow of the gas through the first and second flow channels such that the rate of flow through the first flow channel is different than the rate of flow through the second flow channel.

10 32. A method for etching a substrate comprising:

distributing gas to an inner portion of the substrate via a first flow channel;
distributing the gas to an outer portion of the substrate via a second flow channel;
energizing the gas to remove material from the substrate; and

15 controlling the flow of gas through the first and second flow channels to improve etch uniformity between the inner and outer portions of the substrate.

33. A method for etching a substrate comprising:

distributing a first gas to an inner portion of a layer of the substrate via a first flow channel;

20 distributing the first gas to an outer portion of the layer of the substrate via a second flow channel;

energizing the first gas to remove material from the layer of the substrate;

controlling the flow of gas through the first and second flow channels to improve etch uniformity between the inner and outer portions of the layer of the substrate;

25 distributing a second gas to an inner portion of a second layer of the substrate via the first flow channel;

distributing the second gas to an outer portion of the second layer of the substrate via the second flow channel;

energizing the second gas to remove material from the second layer of the substrate; and

controlling the flow of gas through the first and second flow channels to improve etch uniformity between the inner and outer portions of the second layer of the substrate.

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34. A gas distribution system for distributing a gas to a substrate in an etch chamber, the system comprising:

a gas supply containing a gas;

10 a first flow channel coupled to the gas supply and oriented to distribute the gas to a first portion of the substrate; and

a second flow channel coupled to the gas supply and oriented to distribute the gas to a second portion of the substrate.

15 35. A method for distributing a gas to a substrate in an etch chamber, the method comprising:

distributing a gas to a first portion of the substrate via a first flow channel; and

distributing the gas to a second portion of the substrate via a second flow channel.